# NEW RECORDS OF ALGAE FROM THE WEST END OF LAKE ERIE*

CLARENCE E. TAFT

*Department of Botany and Plant Pathology, The Ohio State University, Columbus, 10*

Knowledge concerning the extent and distribution of the algae of the Island Region of the West End of Lake Erie increases yearly as unrecorded species are discovered. Supplemental lists, and algae reported in connection with the research programs at the Stone Laboratory of The Ohio State University, have constantly increased the number of algae known from the region as last compiled by Tiffany (1934, 1937). The desmids (Taft, 1945), and the Charophyta (Wood, 1947) account for the greatest increase in numbers of forms recorded since 1937. Tiffany did not include these two groups in his original lists. The records, with the possible exception of the Dinophyceae in the present list, have been mostly additions in well-known and widely-distributed groups. Undoubtedly the more uncommon algae in the present report are the dinophycean genera, *Stylodinium*, *Tetradinium*, *Cystodinium*, and *Hypnodinium*. The latter was found in a polluted pond on North Bass Island, while *Tetradinium* and *Cystodinium* were collected in Haunck Pond, on Middle Bass Island. Haunck, a shallow, weedy pond, has become extensively polluted in recent years since being used as a dumping area for trash, garbage, and fish cleanings. *Stylodinium*, from Fisher Pond, on Middle Bass, was the only one of the four genera that was not collected in badly

*Contribution from the Stone Biological Laboratory, Put-in-Bay, Ohio. Papers from the Department of Botany and Plant Pathology, The Ohio State University, No. 677.

polluted water, though here there is a great amount of decomposing natural vegetation.

The diatoms, which are an important component of the algal flora of the region, have not been studied extensively as yet, though a few have been reported in connection with limnological research. A detailed study of the diatom species and their distribution in the Island Region is now in progress. The successful termination of this study will have two important aspects. It will extend the knowledge of the algae of the region, and more important, it will establish a taxonomic basis that will contribute to the reliability of future research where diatoms are concerned.

Credit for collecting a species by a member of the freshwater algae classes during the summer sessions at Stone Laboratory, Put-in-Bay, Ohio, follows the species description; otherwise I was the collector.

## *Species List*

### CHLOROPHYCEAE

*Gloeocystis ampla* Kuetzing Fig. 1.

Individual colonies angular from mutual compression in the compound colony; cells oblong; embedded in unlamellated gelatinous envelopes. Cells 5.5 to 9 $\mu$ x 7 to 11 $\mu$.

North Bass Island, in rowboat on dock. Collected by Kenneth Horton.

The dimensions of the North Bass material are less than those usually recorded for *G. ampla;* otherwise it is comparable.

*Dactylothece confluens* (Kuetz.) Lagerheim Fig. 4.

Colony small, 4 cells; cells cylindrical to broadly ovoid, with slightly rounded ends; enclosed by lamellated sheaths; chloroplast parietal, laminate; no pyrenoid. Colony 7 to 8 $\mu$ x 15 to 17 $\mu$; cells 3 to 3.5 $\mu$ x 5 to 6 $\mu$.

Kelley Island. Collected by Ann Tomcik.

*Palmodictyon varium* (Naeg.) Lemmerman Fig. 2.

Thallus a tubular, gelatinous strand; cells spherical, linearly arranged; without evident individual sheaths; chloroplast a parietal plate; one pyrenoid. Cells 5 to 7 $\mu$ in diameter.

Gibraltar Island. Collected by John Voltz.

*Ulothrix subconstricta* G. S. West Fig. 3.

Cells only slightly constricted at crosswalls; without an evident sheath; chloroplast an irregular parietal plate, extending from two-thirds to nearly the length of the cell; with none to 3 pyrenoids. Cells 5.5 to 7.5 $\mu$ x 16 to 30 $\mu$.

North Bass Island, in rowboat on dock. Collected by Richard Medve.

*Radiofilum flavescens* G. S. West. Fig. 8.

---

EXPLANATION OF FIGURES IN PLATE I

FIGURE 1. *Gloeocystis ampla* Kuetzing
FIGURE 2. *Palmodictyon varium* (Naeg.) Lemmerman
FIGURE 3. *Ulothrix subconstricta* G. S. West
FIGURE 4. *Dactylothece confluens* (Kuetz.) Lagerheim
FIGURE 5. *Kirchneriella elongata* G. M. Smith
FIGURE 6. *Selenastrum minutum* (Naeg.) Collins
FIGURE 7. *Ankistrodesmus falcatus* var. *tumidus* (West & West) G. S. West
FIGURE 8. *Radiofilum flavescens* G. S. West
FIGURE 9. *Hyalotheca dissiliens* (Smith) De Brébisson
FIGURE 10. *Coronastrum aestivale* Thompson Redrawn from Thompson.
FIGURE 11. *Chrysamoeba radians* Klebs
FIGURE 12. *Trachelomonas caudata* (Ehr.) Stein
FIGURE 13. *Phacus morii* Skvortzow var. *insecta* (Koczwara) Skvortzow
FIGURE 14. *Euglena minuta* Prescott
FIGURE 15. *Trentepohlia aurea* (L.) Martius a. apical cell with pectose peg.

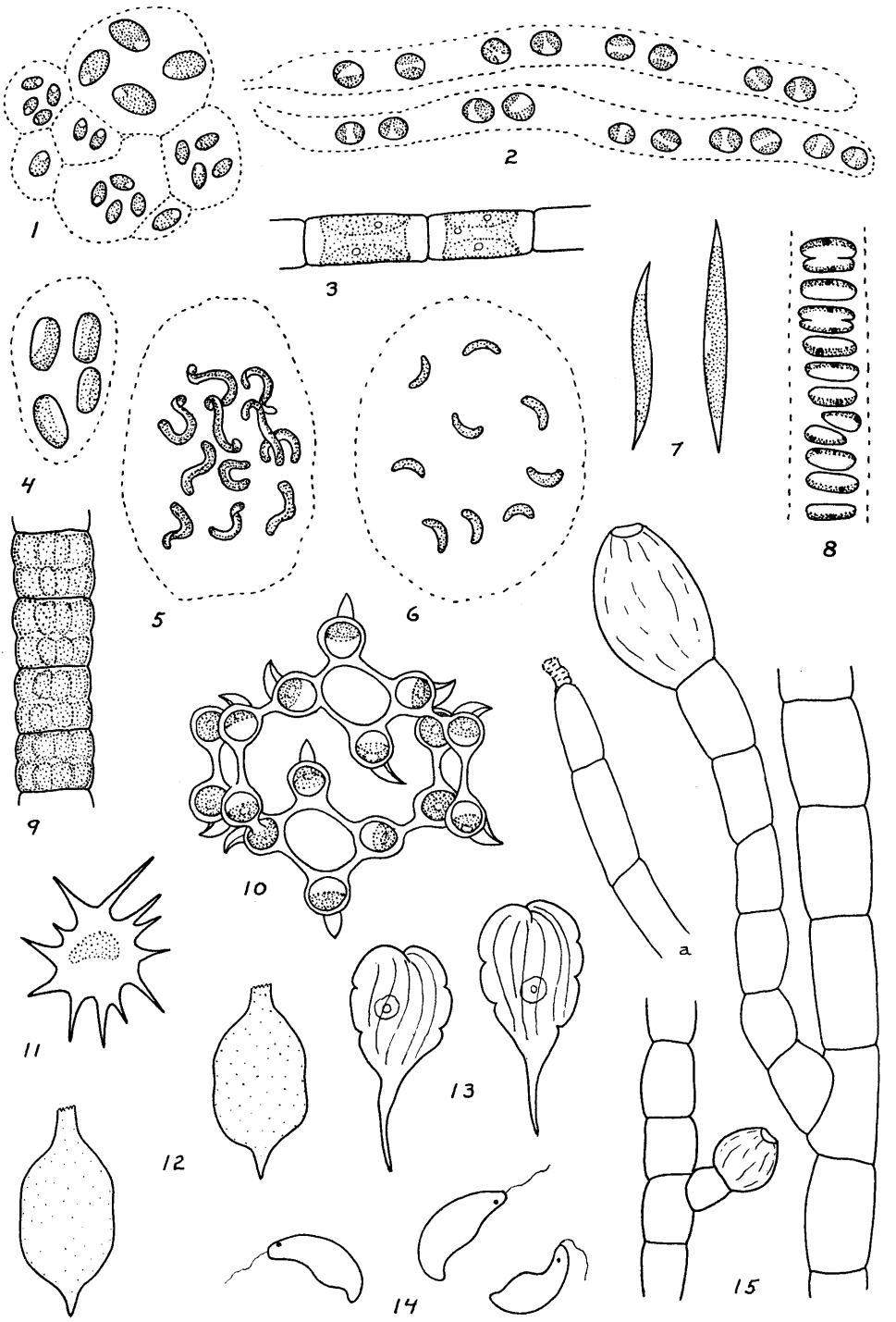


PLATE I

Filaments long, enclosed in a gelatinous sheath; cells ellipsoidal to mostly subquadrate; chloroplast a parietal plate along the transverse wall; 1 pyrenoid. Cells 7 to 8 $\mu$ in diameter, 4 to 5 $\mu$ long.
Kelley Island, plankton in deep quarry pool.

The cells of the Kelley Island specimens are distinctly flattened in contrast to those figured by West (1899). Prescott's figure (1951) shows the cells as being intermediate in shape between those of West and the Kelley Island material.

*Trentepohlia aurea* (L.) Martius Fig. 15.

Algal mass felt-like, on rocks, orange-brown, or green-olive when wet; filaments branched, branch cells cylindrical; older cells sometimes slightly swollen; cellwall thick, smooth; terminal cell bluntly rounded, some with a cap or peg of pectose (Fig. 15a); sporangia globose or ovate, lateral or terminal. Cells 10 to 25 $\mu$ in diameter.
South Bass; Gibraltar Island.

*Ankistrodesmus falcatus* var. *tumidus* (West & West) G. S. West Fig. 7.

Cells fusiform, sometimes slightly sigmoid, tumid, 4 to 6 $\mu$ x 47 to 54 $\mu$.
Middle Bass, Fisher Pond.

*Selenastrum minutum* (Naeg.) Collins Fig. 6.

Colonies in plankton; cells irregularly arranged in a soft, mucilagenous matrix, crescent-shape, poles bluntly pointed. Cells 3 to 3.5 $\mu$ in diameter, 6 to 8 $\mu$ between the apices.
South Bass.

*Kirchneriella elongata* G. M. Smith Fig. 5.

Colony with a homogenous, gelatinous sheath; cells 8 to 16, elongate, rounded ends, irregularly twisted and entwined; chloroplast single, parietal; no pyrenoid. Cells 3 $\mu$ x 14 to 20 $\mu$.
East Harbor.

*Coronastrum aestivale* Thompson Fig. 10.

The following description is from Thompson (1938). "Cells pyriform or globose, 3.3 to 3.6 $\mu$ in diameter, each containing one parietal chloroplast and one pyrenoid; coenobia composed of four cells arranged in a flat plate (which later is distorted) at the angles of a square, remote from one another but connected by strands of cell-wall substance; each cell bearing a scale-like fragment of mother-cell wall. Four to 16 coenobia may be united by strands of cell-wall substance; each coenobium attached to corners of a square, but with the plane of each coenobium at right angles to the plane of the colony as a whole."
Middle Bass, Haunck Pond. Collected by Jack Kishler.

It is interesting that the original collection of *Coronastrum aestivale* by Thompson was from "very polluted water." The Haunck Pond location is also extremely polluted.

*Hyalotheca dissiliens* (Smith) De Brébisson Fig. 9.

Filaments with broad gelatinous sheaths; cells broader than long, apices flattened, wall smooth, with a slight median constriction; chloroplasts axial with six radiating flanges; one central pyrenoid. Cells 12 to 15 $\mu$ long, 23 to 25 $\mu$ broad.
Kelley Island, deep quarry pool.

## CHRYSOPHYCEAE

*Chrysamoeba radians* Klebs Fig. 11.

Cells solitary; free-floating; with radiating pseudopodia; 2 (?) chromatophores.
Kelley Island, plankton in deep quarry. Collected by Carol Reichert.

## EUGLENOPHYCEAE

*Euglena ehrenbergii* Klebs Fig. 28.

Cells metabolic, but usually straight, slight if any tapering at the poles which

are truncately rounded; membrane twisted-striate; body flattened-elliptic, sometimes twisted; chloroplasts ovoid discs; paramylum bodies elongate. Cell 24 $\mu$ x 190 to 200 $\mu$.
Middle Bass, Fisher Pond.
*Euglena minuta* Prescott Fig. 14.

Cells strongly metabolic, shape various, though usually curved-fusiform, posterior end a short, rounded tip; flagellum less than the length of the cell. Cells 4.5 to 7 $\mu$ x 10 to 14 $\mu$.
Middle Bass, Haunck Pond. Collected by Barbara Wagner.

The cell membrane appeared to be smooth, but the number and form of the paramylum bodies were not ascertained.
*Phacus morii* Skvortzow var. *insecta* (Koczwara) Skvortzow Fig. 13.

Cells oval, with usually two lateral indentations; cellwall finely striate; chloroplasts small, round; 1 large, ring-shaped paramylum body. Cells 32 to 34 $\mu$ x 69 to 71 $\mu$.
Middle Bass, Haunck Pond.

Though the dimensions of the Haunck Pond specimens are slightly less than those recorded for *P. morii* var. *insecta* (34 $\mu$ x 80 to 94 $\mu$), the cell structures and configuration resemble closely those of the variety *P. m. insecta.*
*Trachelomonas caudata* (Ehr.) Stein Fig. 12.

Test ellipsoid-ovoid, with slightly concave lateral margins; narrowed abruptly into a short caudus; anterior end narrowed abruptly into a long neck having numerous minute teeth along the margin; wall slightly yellowish, indistinctly punctate. Test 26 to 30 $\mu$ x 57 to 64 $\mu$.
Middle Bass, Haunck Pond.

Individuals referred to *T. caudata* by various authors vary greatly in the configuration and sculpturing of the test. Dimensions are also variable, with those of the Haunck Pond specimens being greater than generally reported.

## DINOPHYCEAE

*Gymnodinium aeruginosum* Stein Fig. 16.

Cells slightly longer than broad, flattened slightly dorsoventrally; transverse furrow divides the cell in two unequal parts; epicone larger and more pointed than the broadly rounded hypocene; chromatophores small, parietal, oval; color bright blue-green to bright blue. Cells 24 to 25 $\mu$ x 30 to 31 $\mu$.
Middle Bass, Fisher Pond. Rare.

Individuals have been seen occasionally during several years of collecting. They swim rapidly, and after death or preservation, become disorganized to such an extent that most cell characters, except color, are unrecognizable. This causes any study of a critical nature to be difficult. The Fisher Pond specimens have a rounded hypocone rather than the truncate shape figured by Pascher (1913). They compare favorably in size with *Gymnodinium viride* Penard but the shape of the cell is not comparable. Cysts, and dividing cysts, are relatively common (Fig. 16a).
*Glenodinium pulvisculus* (Ehr.) Stein Fig. 17.

Cells ovate to nearly globose; epicone and hypocene broadly rounded; longitudinal furrow extends slightly into the epicone and far into the hypocone; cellwall plates not visible; chromatophores numerous, golden-brown. Cells 22 to 27 $\mu$ x 25 to 31 $\mu$.
Middle Bass, Fisher Pond.

Eddy (1930) and Prescott (1951) suggests that a further study of the cellwall may place this species in the genus *Gymnodinium.*
*Diplosalis acuta* (Apstein) Entz fil. Fig. 18.

Cells flattened longitudinally, nearly circular in end view (Fig. 18a); epicone longer than the hypocone; according to Eddy (1930), the epicone has 7 precingular,

1 rhomboidal, 2 ventral apicals, and 1 median apical plate; plates reticulated; the longitudinal furrow, with a pronounced ridge or flange on the left, and a thickened right edge, does not enter the epicone; chromatophores (?); color grey-brown to dark chestnut brown. Cells 44 to 49 $\mu$ long and 42 to 49 $\mu$ broad.
Deep water plankton, Put-in-Bay Harbor, and off North Bass dock.

The genus *Diplosalis* contains mostly marine species, but *D. acuta* is known from fresh water.

*Cystodinium bataviense* Klebs Fig. 20, 21.

Cells broadly lunate with one margin more strongly convex than the other; poles broadly rounded, or produced into short, blunt teeth; chromatophores golden-brown, numerous, parietal, discoid to narrowly ovoid; some cells with a red oil globule. Cells 50 to 58 $\mu$ x 69 to 104 $\mu$.
Middle Bass, Haunck Pond.

There is a decided variation in the cell shape and size of individuals collected July 7, 1956, (Fig. 20) and those collected August 2, 1962 (Fig. 21). The cells in the former collection measured 50 to 56 $\mu$ x 69 to 89 $\mu$, while the 1962 specimens measured 58 $\mu$ x 104 $\mu$. No reproduction was seen. Thompson (1949) records similar variations in cell shape and size. When more material becomes available for study, the Lake Erie specimens may be resolved into two separate species.

*Cystodinium iners* Geitler Fig. 19.

Cells solitary, with strongly convex outer margins and straight to slightly curved inner margins; ends produced into stout, curved spines. Cells 25 to 28 $\mu$ x 55 to 65 $\mu$.
Middle Bass, Haunck Pond.

This alga was erronously reported (Taft, 1942) as *Tetraedron siamensis* (W. & G. S. West) Wille.

*Hypnodinium sphaericum* Klebs Fig. 22.

Cells solitary; spherical; free-floating; non-motile; chromatophores elongate-ellipsoid, aggregated into parietal rosettes which form a reticulum; cells with one red oil globule; protoplast with a gymnodinoid organization. Cells 64 to 66 $\mu$ in diameter.
North Bass, Mound Pond; under Lemna cover near Smith Pond.

*Stylodinium globosum* Klebs Fig. 23.

Cells globose, stipitate, sessile; stipe enlarged slightly at juncture with cell, ending in a disc-like holdfast; stipe and holdfast colorless in most individuals, jet black in some; chromatophores parietal, ovoid, golden-brown; nucleus evident; some cells with a red oil globule. Cells 29 to 33 $\mu$ in diameter, stipe 7 to 8.5 $\mu$ long.
Middle Bass, Fisher Pond. Sessile on *Hydrodictyon* and *Oedogonium*.

*Tetradinium javanicum* Klebs Fig. 24.

Cells solitary; tetrahedrally lobed; two horn-like processes at each lobe; stipe

---

EXPLANATION OF FIGURES IN PLATE II

FIGURE 16. *Gymnodinium aeruginosum* Stein a. Germinating cysts.
FIGURE 17. *Glenodinium pulvisculus* (Ehr.) Stein
FIGURE 18. *Diplosalis acuta* (Apstein) Entz fil. a. Antapical view.
FIGURE 19. *Cystodinium iners* Geitler
FIG. 20, 21. *Cystodinium bataviense* Klebs
FIGURE 22. *Hypnodinium sphaericum* Klebs Redrawn from Thompson.
FIGURE 23. *Stylodinium globosum* Klebs
FIGURE 24. *Tetradinium javanicum* Klebs a. Apical view.
FIGURE 25. *Borzia triocularis* Cohn
FIGURE 26. *Dichothrix orsiniana* (Kuetz.) Bornet & Flahault
FIGURE 27. *Asterocystis smaragdina* (Reinsch) Forti
FIGURE 28. *Euglena ehrenbergii* Klebs

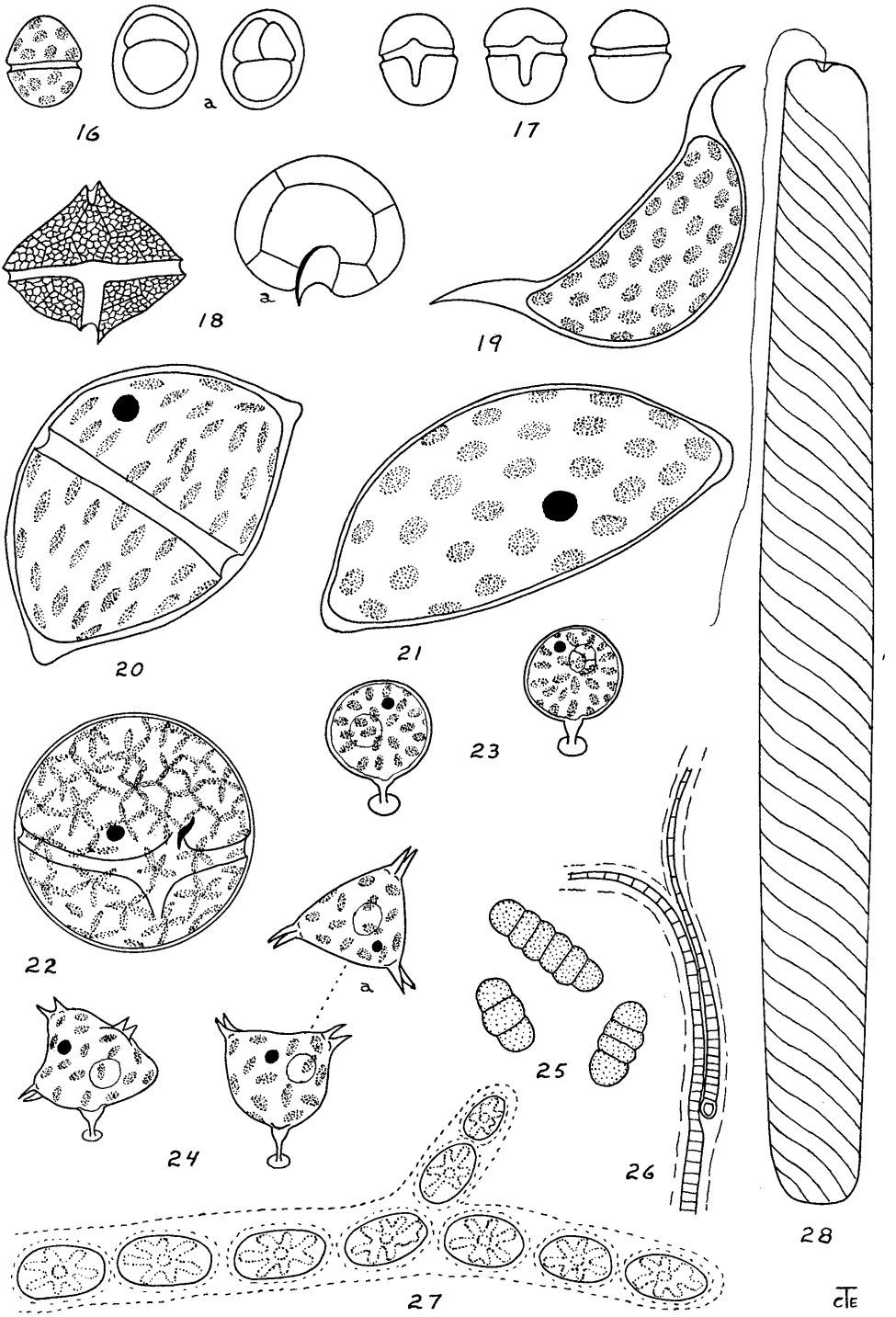


PLATE II

enlarged at point of attachment to cell, terminating in a disc-like holdfast; chromatophores parietal, golden-brown, ovoid; nucleus evident, usually epicentric; red oil globule in some cells. Cells, including horns, 26 to 43 $\mu$ in diameter.
Middle Bass, Haunck Pond. Sessile on *Oedogonium* and insect exuvia, though many individuals with stipes were free-floating. Collected by Ann Cali.

RHODOPHYCEAE

*Asterocystis smaragdina* (Reinsch) Forti Fig. 27.

Filaments simple or branched; cells mostly oblong, enclosed in distinct gelatinous sheaths; chromatophores axial, stellate, with a conspicuous pyrenoid. Cells 7 to 9 $\mu$ x 10 to 14 $\mu$.
Gibraltar Island, off dock; Buckeye Island, beach pool.

MYXOPHYCEAE

*Borzia triocularis* Cohn Fig. 25.

Trichomes of three to six cells, no sheath; terminal cells hemispherical. Length of trichome 10 to 25 $\mu$, breadth 6 to 7 $\mu$.
Gibraltar Island, collected by Robert Doyle; Kelley Island, collected by Phillip Halicki.

*Dichothrix orsiniana* (Kuetz.) Bornet & Flahault Fig. 26.

Plant mass tufted, slippery; trichomes tapering, in flexuous, thick, indistinctly lamellated, tapering sheaths; branches common, remaining for most of their length within the common sheath; trichome 7 to 13 $\mu$ in diameter at base, vegetative cells 3 to 4 $\mu$ long; heterocysts subglobose to hemispherical, 7 to 11 $\mu$ in diameter.
Kelley Island, attached to partially submerged rock in quarry.

LITERATURE

**Collins, F. H.** 1909. The Green Algae of North America. Tufts College Studies, Sci. Ser. 2: 79–480.
**Daily, W. A.** 1943. First reports for the algae *Borzia*, *Aulosira*, and *Asterocystis* in Indiana. Butler Univ. Bot. Studies 6: 84–86.
**Deflandre, G.** 1926. Monographie du genre *Trachelomonas* Ehr. Nemours, Paris. 162 p.
**Eddy, S.** 1930. The fresh-water Armored or Thecate Dinoflagellates. Trans. Am. Micros. Soc. 46(4): 277–321.
**Gojdics, Mary.** 1953. The genus Euglena. Univ. Wis. Press. Madison, Wis. 268 p.
**Pascher, A.** 1913. Die Süsswasserflora Deutschlands, Osterreichs und der Schweiz. 3. Dinoflagellatae. Jena. 66 p.
———. 1915. Die Süsswasserflora Deutschlands, Osterreichs und der Schweiz. 5. Chlorophyceae 2. Jena. 250 p.
**Prescott, G. W.** 1951. Algae of the Western Great Lakes Area. Cranbrook Institute of Science. Bull. 31. 946 p.
**Skvortzow, B. W.** 1928. Die Euglenaceengattung *Phacus* Dujardin. Berichte Deutsches Botanischen Gesellschaft 46: 105–125.
**Smith, G. M.** 1950. Freshwater Algae of the United States. Ed. 2. McGraw-Hill Book Co., N. Y. 719 p.
**Taft, C. E.** 1942. Additions to the algae of the West End of Lake Erie. Ohio J. Sci. 42(2): 251–256.
———. 1945. The desmids of the West End of Lake Erie. Ohio J. Sci. 45(5): 180–205.
**Thompson, R. H.** 1938. *Coronastrum*: a new genus of algae in the family Scenedesmaceae. Am. J. Bot. 25: 692–694.
———. 1947. Fresh-water Dinoflagellates of Maryland. Publ. No. 67, Chesapeake Biol. Lab., Solomons Isl., Maryland. 28 p.
———. 1949. Immobile Dinophyceae. I. New records and a new species. Am. J. Bot. 36: 301–308.
**Tiffany, L. H.** 1934. The Plankton Algae of the West End of Lake Erie. Contribution No. 6, The Franz Theodore Stone Laboratory. The Ohio State University Press, Columbus, Ohio. 112 p.
———. 1937. The Filamentous Algae of the West End of Lake Erie. Contribution No. 7, The Franz Theodore Stone Laboratory. Am. Mid. Nat. 18(6): 911–951.
**West, G. S.** 1899. The alga-flora of Cambridgeshire. J. Bot. 37: 49–58.
**Wood, R. D.** 1947. Characeae of the Put-in-Bay Region of Lake Erie (Ohio). Ohio J. Sci. 47(7): 240–258.